# UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 7221

CR NO. 24

OVER

VERMILLION RIVER

DISTRICT 1 – ST. LOUIS COUNTY

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

COLLINS ENGINEERS, INC.

JOB NO. 5221

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 7221, Piers 1 and 2, were found to be generally in good condition. The few defects and areas of soft concrete that were observed are not structurally significant at this time. Scour depressions, 6 feet in radius with 2 feet of depth maximum, were observed at the upstream and downstream columns of Piers 1 and 2. Otherwise, the channel bottom at the bridge appeared stable.

INSPECTION FINDINGS:

(A) Scaling was observed from 4 feet above the waterline to 1 foot below the waterline with ½ inch maximum penetration at the upstream and downstream columns of Piers 1 and 2.

(B) Scour depressions 6 feet in radius by a maximum depth of 2 feet were observed at the upstream and downstream columns of both piers.

(C) A light accumulation of timber debris consisting of logs up to 10 inch in diameter was located at the upstream column of Pier 2 at the channel bottom.

(D) A moderate accumulation of timber debris consisting of 1 foot diameter and smaller logs and branches was observed at the upstream column of Pier 1 extending from the channel bottom up 2 feet.

RECOMMENDATIONS:

(A) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Daniel G. Stromberg

Date 6/30/2008 Registration No. 21491

Respectfully submitted,

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 7221

Feature Crossed: Vermillion River

Feature Carried: CR No. 24

Location: District 1 – St. Louis County

Bridge Description: The superstructure consists of a three span, steel girder bridge supporting a reinforced concrete deck. The superstructure is supported by two reinforced concrete abutments and two reinforced concrete column bents. The columns are founded on rectangular footings keyed into bedrock. The piers are numbered 1 and 2, starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Daniel G. Stromberg, P.E., S.E.

Dive Team: John J. Loftus, Valerie Roustan

Date: August 25, 2007

Weather Conditions: Cloudy, $50^{o}$ F

Underwater Visibility: 5.0 feet

Waterway Velocity: Negligible/None

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2

General Shape: The piers consist of a rectangular reinforced concrete pile cap supported by two concrete columns.

Maximum Water Depth at Substructure Inspected: Approximately 4.1 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier cap on the upstream end of Pier 2.

Water Surface: The waterline was approximately 10.6 feet below reference. Waterline Elevation = 1207.27.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 7

Item 61: Channel and Channel Protection: Code 7

Item 92B: Underwater Inspection: Code B/08/07

Item 113: Scour Critical Bridges: Code F/07

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

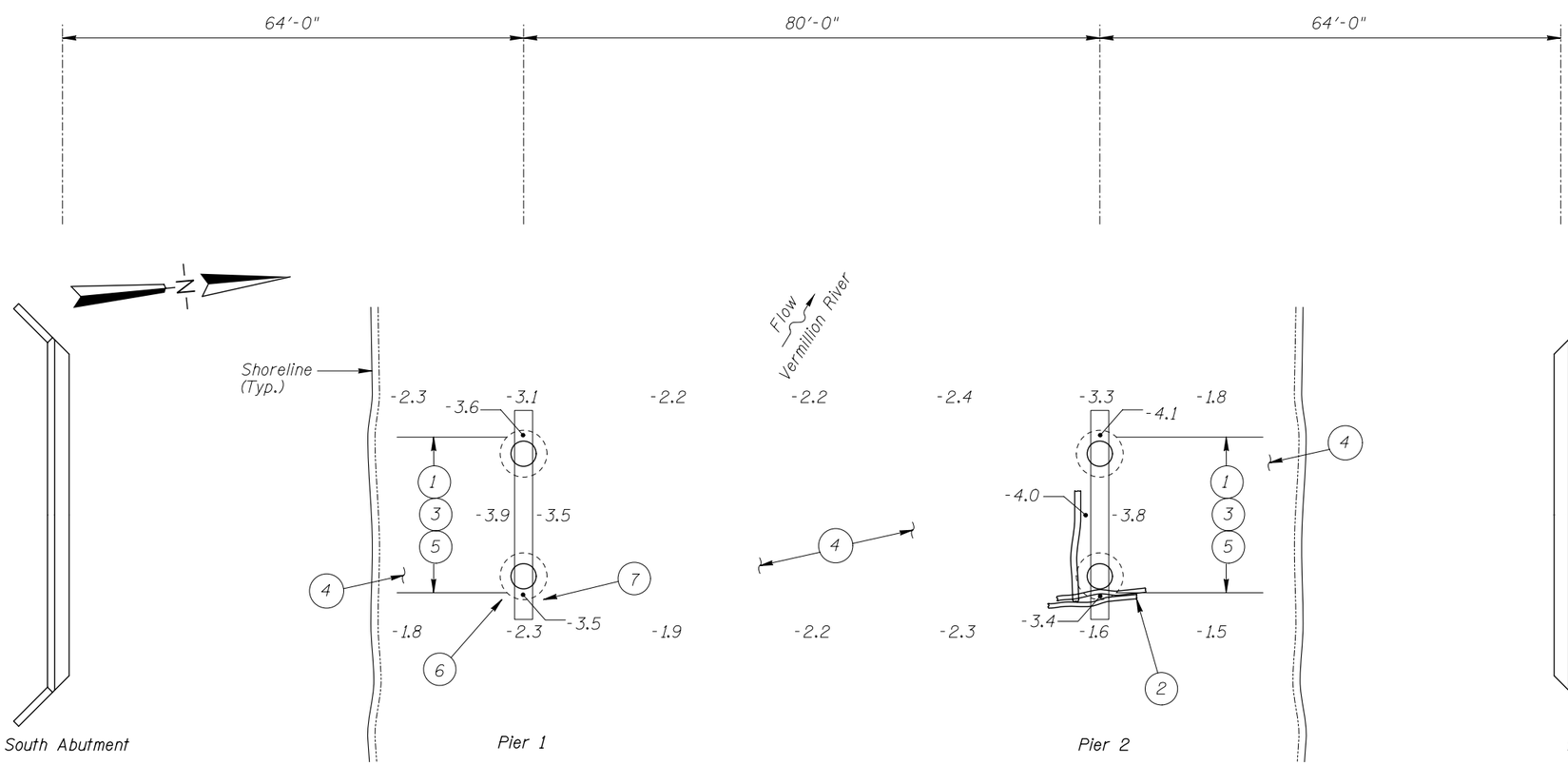
_____ Yes X No

Photograph 1. Overall View of Structure, Looking Southwest.

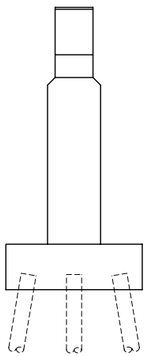
Photograph 2. Overall of Pier 1, Looking Southeast.

Photograph 3. View of Pier 2, Looking Northeast.

Photograph 4. View of Typical Scaling at Upstream Colum of Pier 2, Looking Southwest.




SOUNDING PLAN



TYPICAL END VIEW OF PIERS

INSPECTION NOTES:

1. Overall concrete was smooth and sound.
2. A light accumulation of timber debris consisting of logs up to 10 inches in diameter was located at upstream column of Pier 2 at channel bottom.
3. Scaling was observed 4 feet above waterline to 1 foot below waterline with a 1/2 inch maximum penetration (1/4 inch typical) at upstream and downstream columns of Piers 1 & 2.
4. Channel bottom consisted of scattered rocks 2 feet in diameter and smaller, sandy silt and gravel with up to 6 inch probe rod penetration.
5. Scour depression 6 feet in radius, 2 feet deep was observed at upstream column of Piers 1 & 2. Also, scour depression 6 feet in radius, 1 foot deep was observed at downstream column of Piers 1 & 2.
6. Soft silt infilling (1 foot) was covering scour depression at upstream column of Pier 2.
7. Moderate accumulation of timber debris consisting of 1 foot diameter and smaller branches was observed at upstream column of Pier 1 extending from channel bottom up 2 feet.

GENERAL NOTES:

1. Piers 1 and 2 were inspected underwater.
2. At the time of inspection on August 25, 2007 the waterline was located approximately 10.6 feet below the top of the pier cap at the upstream end of Pier 2. This corresponds to a waterline elevation of 1205.9 based on design drawings.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

Legend

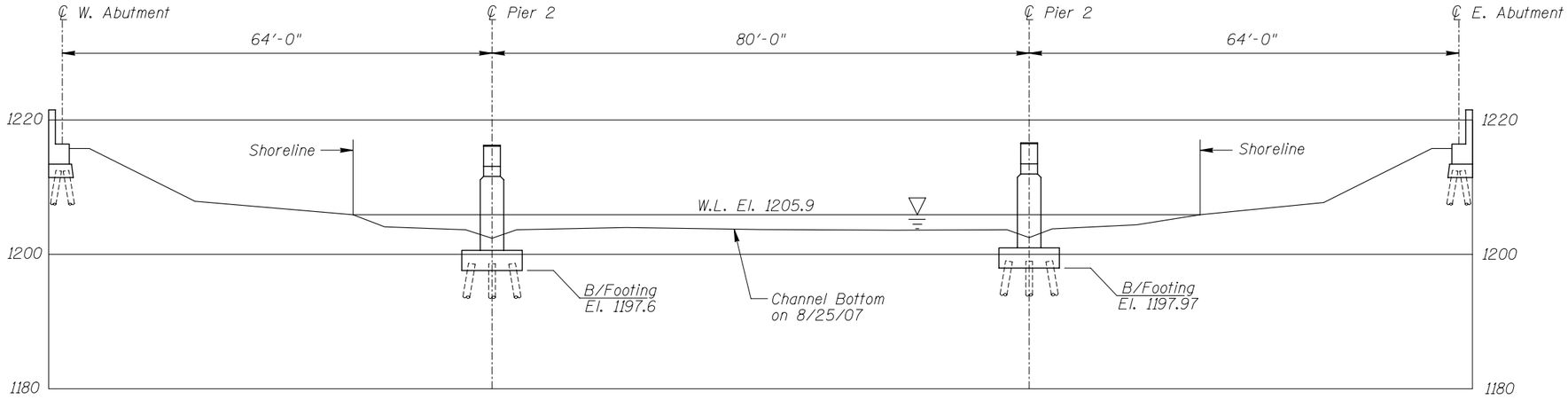
| | |
|---|---|
| -4.0 | Sounding Depth (8/25/07) |
| ◌ | Scour Depression |

**MINNESOTA**
**DEPARTMENT OF TRANSPORTATION**
**UNDERWATER BRIDGE INSPECTION**

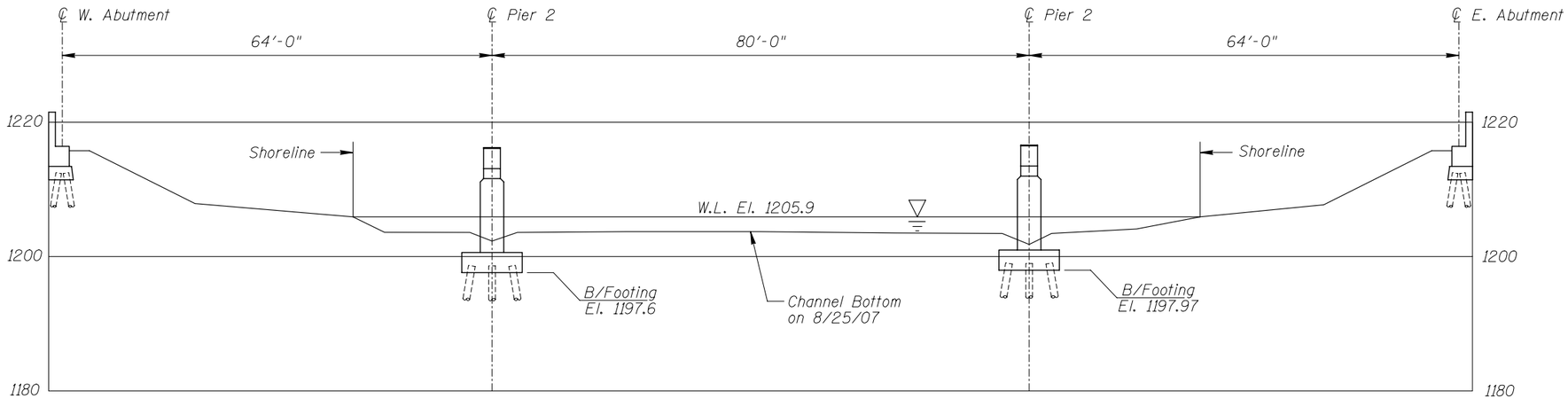
STRUCTURE NO. 7221
OVER THE VERMILLION RIVER
DISTRICT 1, ST. LOUIS COUNTY

# INSPECTION AND SOUNDING PLAN

| | | |
|---|---|---|
| Drawn By: PRH | COLLINS ENGINEERS 123 North Wacker Drive Suite 300 Chicago, Il. 60606 (312) 704-9300 www.collinsengr.com | Date: AUGUST, 2007 |
| Checked By: DGS | | Scale: NTS |
| Code: 52210014 | | Figure No.: 1 |




UPSTREAM FASCIA PROFILE




DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

**MINNESOTA**
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# UPSTREAM AND DOWNSTREAM FASCIA PROFILES

| | | |
|---|---|---|
| Drawn By: PRH | COLLINS ENGINEERS | Date: AUGUST, 2007 |
| Checked By: DGS | 123 North Wacker Drive Suite 300 Chicago, Il. 60606 (312) 704-9300 www.collinsengr.com | Scale: 1"=20 |
| Code: 52210014 | | Figure No.: 2 |

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Collins Engineers, Inc. DATE: August 25, 2007

ON-SITE TEAM LEADER: Daniel G. Stromberg, P.E., S.E.

BRIDGE NO: 7221 WEATHER: Cloudy, 50° F

WATERWAY CROSSED: Vermillion River

DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR

_____ OTHER_____

PERSONNEL: John J. Loftus, Valerie Roustan

EQUIPMENT: Scuba, Scraper, Lead Line, Sounding Pole, Probe Rod, Camera

TIME IN WATER: 2:00 p.m.

TIME OUT OF WATER: 2:20 p.m.

WATERWAY DATA: VELOCITY Negligible / None

VISIBILITY 5.0 feet

DEPTH 4.1 feet maximum at Pier 2

ELEMENTS INSPECTED: Piers 1 and 2

REMARKS: Overall, concrete was smooth and sound. Scaling was observed 4 feet above the waterline to 1 foot below the waterline at the upstream and downstream columns of Piers 1 and 2. Scour depressions, 6-foot-radius by a maximum depth of 2 feet, were observed at the upstream and downstream columns of both piers. Light to moderate accumulations of timber debris was observed at the upstream columns of Piers 1 and 2.

FURTHER ACTION NEEDED: _____ YES X NO

Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of five (5) years.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

# UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 7221
INSPECTORS Collins Engineers, Inc.
ON-SITE TEAM LEADER. Daniel G. Stromberg, P.E., S.E.
WATERWAY CROSSED Vermillion River

INSPECTION DATE August 25, 2007

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

## CONDITION RATING

| | | | SUBSTRUCTURE | | | | | | CHANNEL | | | | | GENERAL | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| UNIT REFERENCE NO. | UNIT DESCRIPTION | MAXIMUM DEPTH OF WATER | PILING | COLUMNS, SHAFTS, OR FACES* | FOOTINGS | DISPLACEMENT | OTHER | OVERALL SUBSTRUCTURE CONDITION CODE* | SCOUR | EMBANKMENT EROSION | EMBANKMENT PROTECTION | OTHER (DRIFT/DEBRIS) | OVERALL CHANNEL & PROTECTION CONDITION | CONCRETE | STEEL | TIMBER | LOSS OF SECTION | PREVIOUS REPAIR OR MAINTENANCE | OTHER |
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
| | Pier 1 | 3.9’ | N | 7 | N | 9 | N | 7 | 7 | 8 | 8 | 7 | 7 | 7 | N | N | N | N | N |
| | Pier 2 | 4.1’ | N | 7 | N | 9 | N | 7 | 7 | 8 | 8 | 7 | 7 | 7 | N | N | N | N | N |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |

*UNDERWATER PORTION ONLY

REMARKS: Overall, concrete was smooth and sound. Scaling was observed 4 feet above the waterline to 1 foot below the waterline at the upstream and downstream columns of Piers 1 and 2. Scour depressions, 6-foot-radius by a maximum depth of 2 feet, were observed at the upstream and downstream columns of both piers. Light to moderate accumulations of timber debris was observed at the upstream columns of Piers 1 and 2.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.